Unmanned Sea Surface Vehicle

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At a Glance

What is it?

- The Unmanned Sea Surface Vehicle, or USSV, are clean-sheet design vehicles developed by the Office of Naval Research. The USSV-High Tow Force (HTF) is optimized for tow force, payload fraction, endurance and seakeeping. The USSV-High Speed (HS) is optimized for high speed in a seaway. ONR is currently using both crafts for experimentation. In addition, the USSV-HTF design has transitioned to an acquisition program as a prototype.

How does it work?

- USSV-HTF and USSV-HS vessels are in the 11- to 12-meter size range. The USSV-HTF is a semi-planing monohull and the HS is a hydrofoil; both are powered by twin diesel engines. The USSVs are clean-sheet designs, optimized for missions and payloads anticipated by the Navy. The USSVs use an autonomous control system. More advanced autonomy—which will enable mission-level planning, perception-guided maneuvers and tactical behaviors—is currently in development,

What will it accomplish?

- USSVs will enable certain navalmissions to be performed without putting humans in hazardous areas. In addition, they will act as force multipliers to existing fleet assets.

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Early unmanned surface vehicles consisted primarily of converted manned platforms (rigid-hull inflatable boats). However, these platforms proved to be incapable of performing the required missions in terms of tow capability, payload fraction, endurance and seakeeping.

The Office of Naval Research (ONR) initiated a science and technology effort to develop clean-sheet unmanned surface vehicle designs optimized for Navy missions. This resulted in the USSV-HTF and USSV-HS designs. ONR is also developing advanced autonomy, and launch, recovery and refueling. In particular, one focus has been on perception-guided maneuvers, as depicted above.

Research Challenges and Opportunities:

- Autonomy: Current ONR programs are focused on developing mission-level autonomy, perception-guided maneuvers and unmanned surface behaviors in more complex environments.
- Platforms: A great deal of work has been done in the past few years on purpose-built, clean sheet design unmanned surface vehicles; however, these designs still resemble manned craft to a large extent. Are there innovative designs that are enabled by the fact that the craft is unmanned? Additionally, technologies (especially materials and propulsion) that would result in weight savings would be of great value.
- Launch, Recovery and Underway Refueling: Much progress has been made in the past five years in automating these processes, but they remain limited to relatively low sea states.